AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listings in the application:

Listing of Claims

1.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation to a patient, comprising:

detecting neural inspiratory activation of the patient;

applying a positive pressure to the patient's airways to inflate the patient's lungs;

applying a negative pressure around the patient's ribcage and/or abdomen in order to reduce a load imposed by the ribcage and/or abdomen on the patient's lungs; and

~~synchronizing application of the positive and negative pressures~~ controlling application of the positive and negative pressures in response to the detected neural inspiratory activation of the patient.

2.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein ~~synchronising~~ controlling application of the positive and negative pressures comprises synchronizing application of the positive and negative pressures ~~comprises :~~

~~simultaneously applying the positive pressure to the patient's airways and the negative pressure around the patient's ribcage and/or abdomen.~~

3.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, comprising:

adjusting levels of the positive and negative pressures to avoid application of excessive positive pressure to the patient's airways and thereby minimize hemodynamic adverse effects.

4.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein ~~applying a positive pressure to the patient's airways comprises: detecting neural inspiratory activation of the patient; and applying~~ controlling application of the positive and negative pressures comprises controlling a level of the positive pressure applied to the patient's airways as a function of the detected neural inspiratory activation.

5.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim [[4]] 2, wherein synchronizing application of the positive and negative pressures comprises:

synchronizing triggering and termination of the application of the positive pressure to the patient's airways as a function of the detected neural inspiratory activation.

6.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein applying a positive pressure to the patient's airways detecting neural inspiratory activation of the patient comprises detecting a level of neural inspiratory activation of the patient, and wherein controlling application of the positive and negative pressures comprises:

determining a target level of neural inspiratory activation of the patient;

detecting a level of neural inspiratory activation of the patient;

comparing the detected level of neural inspiratory activation with the determined target level; and

controlling a level of positive pressure applied to the patient's airways as a function of the comparison.

7.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 6, wherein synchronizing application of the positive and negative pressures controlling application of the positive and negative pressures comprises:

synchronizing triggering and termination of the application of the positive pressure to the patient's airways in relation to the detected level of neural inspiratory activation.

8.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 6, wherein controlling the level of positive pressure applied to the patient's airways comprises:

increasing the level of positive pressure applied to the patient's airways when the comparison indicates that the detected level of neural inspiratory activation of the patient is higher than the determined target level.

9.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 6, wherein controlling the level of positive pressure applied to the patient's airways comprises:

decreasing the level of positive pressure applied to the patient's airways when the comparison indicates that the detected level of neural inspiratory activation of the patient is lower than the determined target level.

10.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 6, wherein controlling the level of positive pressure applied to the patient's airways comprises:

maintaining a present level of positive pressure applied to the patient's airways when the comparison indicates that the detected level of neural inspiratory activation of the patient is equal to the determined target level.

11.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein applying a negative pressure around the patient's ribcage and/or abdomen comprises:

applying a constant negative pressure around the patient's ~~ribeage~~ ribcage and/or abdomen during patient's inspiration.

12.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim [[1]] 2, wherein ~~applying a negative pressure around the patient's ribcage and/or abdomen~~ synchronizing application of the positive and negative pressures comprises:

synchronizing triggering and termination of the application of negative pressure with triggering and termination of the application of positive pressure.

13.   (Currently amended) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein ~~applying a negative pressure around the patient's ribcage and/or abdomen~~ controlling application of the positive and negative pressures comprises:

~~detecting neural inspiratory activation of the patient; and~~

~~applying~~ <u>controlling a level of</u> the negative pressure <u>applied</u> around the patient's ribcage and/or abdomen as a function of the detected neural inspiratory activation.

14.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein applying a negative pressure around the patient's ribcage and/or abdomen comprises:

determining a target level of an abdominal pressure swing of the patient;

detecting a level of abdominal pressure swing of the patient;

comparing the detected level of abdominal pressure swing with the determined target level; and

controlling a level of negative pressure applied around the patient's ribcage and/or abdomen as a function of the comparison.

15.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 14, wherein controlling the level of negative pressure applied around the patient's ribcage and/or abdomen comprises:

increasing the level of negative pressure applied around the patient's ribcage and/or abdomen when the comparison indicates that the detected level of abdominal pressure swing of the patient is higher than the determined target level.

16.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 14, wherein controlling the level of negative pressure applied around the patient's ribcage and/or abdomen comprises:

decreasing the level of negative pressure applied around the patient's ribcage and/or abdomen when the comparison indicates that the detected level of abdominal pressure swing of the patient is lower than the determined target level.

17.   (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 14, wherein controlling the level of negative pressure applied around the patient's ribcage and/or abdomen comprises:

maintaining a present level of negative pressure applied around the patient's ribcage and/or abdomen when the comparison indicates that the detected level of abdominal pressure swing of the patient is equal to the determined target level.

18. (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, further comprising applying a constant Negative End-Expiratory Pressure over the abdomen to adjust an end-expiratory lung-volume.

19. (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 18, comprising applying the constant Negative End-Expiratory Pressure over the abdomen in combination with inspiratory negative pressure assist ventilation.

20. (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 18, comprising applying the constant Negative End-Expiratory Pressure over the abdomen in proportional response to tonic inspiratory muscle activation occurring during expiration.

21. (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 1, wherein applying a negative pressure comprises obtaining an intrathoracic pressure estimate by measuring an airway pressure deflection during a patient's airway occlusion.

22. (Original) A method of delivering combined positive and negative pressure assist ventilation as defined in claim 21, wherein, in case of intrinsic PEEP, obtaining an intrathoracic pressure estimate includes an extrapolation for the period between an onset of electrical activity of the patient's diaphragm activity and an onset of the patient's airway pressure deflection.

23. (Currently amended) A system for delivering combined positive and negative pressure assist ventilation to a patient, comprising:

 a sensor of neural inspiratory activation of the patient;

a positive pressure ventilator connected to the patient's airways for applying a positive pressure to the patient's airways to inflate the patient's lungs;

a negative pressure ventilator installed on the patient's ribcage and/or abdomen for applying a negative pressure around the patient's ribcage and/or abdomen in order to reduce a load imposed by the ribcage and/or abdomen on the patient's lungs; and

a controller connected to <u>the sensor of neural inspiratory activation and to</u> the positive and negative pressure ventilators for controlling <s>operation of said</s> <u>application of the</u> positive and negative <s>pressure ventilators</s> <u>pressures in response to the neural inspiratory activation detected by the sensor</u>.

24.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 23, wherein the controller synchronizes operation of the positive and negative pressure ventilators to <s>apply</s> <u>synchronize application of</u> the positive pressure to the patient's airways and the negative pressure around the patient's ribcage and/or abdomen <s>simultaneously</s>.

25.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 23, <s>comprising a sensor of neural inspiratory activation of the patient,</s> <u>wherein</u> the controller <s>being</s> <u>is</u> responsive to the neural inspiratory activation detected by the sensor to control <u>a level of positive pressure applied by</u> the positive pressure ventilator.

26.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 23, comprising:

means for <s>supplying</s> <u>determining</u> a target level of neural inspiratory activation of the patient; <s>and</s>

<s>a</s> <u>wherein the</u> sensor <u>detects a level</u> of neural inspiratory activation of the patient; <u>and</u>

wherein the controller comprises a comparator of the detected level of neural inspiratory activation with the determined target level to control the positive pressure ventilator in relation to this comparison.

27.   (Original) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 23, wherein the controller controls the negative pressure ventilator to apply a constant negative pressure around the patient's ribcage and/or abdomen during patient's inspiration.

28.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 23, ~~comprising: a sensor of neural inspiratory activation of the patient;~~ wherein the controller is responsive to the neural inspiratory activation to control the negative pressure ventilator.

29.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 23, comprising:

means for ~~supplying~~ determining a target level of an abdominal pressure swing of the patient; and

a sensor of a level of abdominal pressure swing of the patient;

the controller comprising a comparator of the ~~detected~~ sensed level of abdominal pressure swing with the determined target level to control the negative pressure ventilator as a function of the comparison.

30.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation to a patient, comprising:

means for detecting neural inspiratory activation of the patient;

first means for applying a positive pressure to the patient's airways to inflate the patient's lungs;

second means for applying a negative pressure around the patient's ribcage and/or abdomen in order to reduce a load imposed by the ribcage and/or abdomen on the patient's lungs; and

means connected to the first and second pressure applying means for ~~synchronizing operation~~ controlling application of the ~~first and second pressure applying means~~ positive and negative pressure in response to the detected neural inspiratory activation.

31.   (Cancelled)

32.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[30]] 23, comprising:

  means for adjusting levels of the positive and negative pressures to avoid application of excessive positive pressure to the patient's airways and thereby minimize hemodynamic adverse effects.

33.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[30]] 23, wherein the first means comprises: means for detecting neural inspiratory activation of the patient; and means for applying the controller controls application of the positive pressure to the patient's airways as a function of the detected neural inspiratory activation.

34.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 33, wherein the synchronizing means comprises: means for synchronizing controller synchronizes triggering and termination of the application of the positive pressure to the patient's airways as a function of the detected neural inspiratory activation.

35.   (Cancelled)

36.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[35]] 26, wherein the controlling means comprises: means for increasing the controller increases a level of positive pressure applied to the patient's airways when the comparison indicates that the detected level of neural inspiratory activation of the patient is higher than the determined target level.

37.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[35]] 26, wherein the controlling means comprises: means for decreasing the controller decreases a level of positive pressure applied to the patient's airways

when the comparison indicates that the detected level of neural inspiratory activation of the patient is lower than the determined target level.

38.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[35]] 26, wherein the controlling means comprises: means for maintaining controller maintains a present level of positive pressure applied to the patient's airways when the comparison indicates that the detected level of neural inspiratory activation of the patient is equal to the determined target level.

39.   (Cancelled)

40.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in [[30]] 23, wherein the synchronizing means comprises: means for synchronizing controller synchronizes triggering and termination of the application of negative pressure with triggering and termination of the application of positive pressure.

41.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[30]] 23, wherein the second means comprises: means for detecting neural inspiratory activation of the patient; and means for applying controller controls a level of the negative pressure applied around the patient's ribcage and/or abdomen as a function of the detected neural inspiratory activation.

42.   (Cancelled)

43.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[42]] 29, wherein the controlling means comprises: means for increasing the controller increases a level of negative pressure applied around the patient's ribcage and/or abdomen when the comparison indicates that the detected sensed level of abdominal pressure swing of the patient is higher than the determined target level.

44.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[42]] 29, wherein the ~~controlling means comprises: means for decreasing the~~ controller decreases a level of negative pressure applied around the patient's ribcage and/or abdomen when the comparison indicates that the ~~detected~~ sensed level of abdominal pressure swing of the patient is lower than the determined target level.

45.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[42]] 29, wherein the ~~controlling means comprises: means for maintaining~~ controller maintains a present level of negative pressure applied around the patient's ribcage and/or abdomen when the comparison indicates that the ~~detected~~ sensed level of abdominal pressure swing of the patient is equal to the determined target level.

46.   (Currently amended) A system for delivering combined positive and negative pressure assist ventilation as defined in claim [[30]] 23, further comprising means for applying a constant Negative End-Expiratory Pressure over the abdomen to adjust an end-expiratory lung-volume.

47.   (Original) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 46, wherein the constant Negative End-Expiratory Pressure applying means comprises means for applying the constant Negative End-Expiratory Pressure over the abdomen in combination with inspiratory negative pressure assist ventilation.

48.   (Original) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 46, wherein the constant Negative End-Expiratory Pressure applying means comprises means for applying the constant Negative End-Expiratory Pressure over the abdomen in proportional response to tonic inspiratory muscle activation occurring during expiration.

49.   (Original) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 30, wherein the means for applying a negative pressure comprises means for obtaining an intrathoracic pressure estimate by measuring an airway pressure deflection during a patient's airway occlusion.

50.   (Original) A system for delivering combined positive and negative pressure assist ventilation as defined in claim 49, wherein, in case of intrinsic PEEP, the intrathoracic pressure estimate obtaining means comprises means for conducting an extrapolation of the intrathoracic pressure estimate for the period between an onset of electrical activity of the patient's diaphragm activity and an onset of the patient's airway pressure deflection.